CHAPTER 15

RESPIRATORY PROTECTION PROGRAM

GENERAL DETAILS ABOUT THE SELECTION AND USE OF RESPIRATORS

TABLE OF CONTENTS

PART 2. SELECTION AND USE OF RESPIRATORS

the 1996 respirator protection guide

1. INTRODUCTION TO RESPIRATORY PROTECTION
2. THE PURPOSE OF RESPIRATORY PROTECTION
3. APPROVED RESPIRATORY PROTECTION EQUIPMENT
4. EQUIPMENT SELECTION
5. TYPES OF RESPIRATORS
6. HOW RESPIRATORS WORK
7. RESPIRATOR PROTECTION FACTORS
8. RESPIRATOR AND CARTRIDGE SELECTION
9. INSPECTION, MAINTENANCE, REPAIR, AND STORAGE
10. RESPIRATOR FIT-TESTING
11. EXPOSURE RECORDS FOR HAZARDOUS MATERIALS

PART 3. CLASSROOM PREPARATION FOR INSTRUCTORS

1. introduction to classroom discussion
2. classroom preparation and required materials
3. organizing handout materials
4. instructor's introduction
5. begin discussion

CHAPTER 15

RESPIRATORY PROTECTION PROGRAM

GENERAL DETAILS ABOUT THE SELECTION AND USE OF RESPIRATORS

PART 1. GENERAL DETAILS

15.0 INTRODUCTION

This chapter represents the Department's respiratory protection program as required by the Cal-OSHA General Industry Safety Orders (GISO), Section 5144, Respiratory Protection Equipment.

15.1 PURPOSE

The purpose of this chapter is to provide information about the use of respiratory protection equipment, and has been divided into three (3) parts as follows:

Part 1. GENERAL DETAILS. Provides general information about the Department's respiratory protection program, roles and responsibilities, and medical certification requirements.

Part 2. **SELECTION AND USE OF RESPIRATORS**. ***the 1996 respiratory protection guide.*** This section is the written text used for classroom discussion. It is also a guide for supervisors and employees whenever questions about respirators arise. It provides information about respiratory hazards, methods of hazard control, equipment selection, fit testing, and inspection and maintenance of respiratory equipment.

Part 3. CLASSROOM PREPARATION FOR INSTRUCTORS. This section covers information for classroom preparation. Instructors will remove **Part 2. *the 1996 respiratory protection guide*** from the manual to make copies for training purposes, or for interested employees, and/or others. (Replace the original pages in the manual after copies have been made.)

This chapter also includes information about the California Department of Food and Agriculture's Pesticide Application Regulations, and the labeling requirements of the National Institute for Occupational Safety and Health (NIOSH), and the Mine Safety and Health Administration (MSHA).

15.2 POLICY STATEMENT

Managers and supervisors are responsible to ensure that employees are protected from exposure to harmful airborne materials in the workplace.

15.3 THE REASON FOR A RESPIRATORY PROTECTION PROGRAM

The reason for respiratory protection program is simple: to protect employee's respiratory system (lungs) from inhaling harmful airborne materials found in the workplace.

Harmful materials can enter the body in four (4) ways:

1. inhalation into the lungs **(the body's respiratory system),**
2. absorption through the skin and eyes,
3. ingestion through the stomach, and/or
4. injection by cut or incision.

Of these four (4) methods of entry, inhalation (through the lungs) is the quickest and most direct route into the body.

The information in this chapter has been written to ensure that supervisors and employees, who use respiratory equipment in their work, understand the risks, limitations, and requirements associated with respirator usage.

NOTE:

Respiratory equipment can only provide protection from inhalation of harmful airborne materials into the respiratory system (lungs).

For information regarding protection from the other forms of exposure (i. e., absorption through the skin and eyes, ingestion through the stomach, and injection) contact the Office of Safety and Health.

15.4 SUMMARY OF RESPIRATORY PROTECTION PROGRAM REQUIREMENTS

Every employee who is expected to use respiratory protection equipment shall complete the following items in the order given:

1st Pass an appropriate medical evaluation by a licensed physician upon initial assignment and annually thereafter.

2nd Receive training initially and at least annually thereafter in the proper use, selection, maintenance, sanitation, and storage of the respiratory protection equipment they will use and/or be assigned.

3rd Must be properly fit tested initially and at least annually thereafter in the respiratory protection equipment they will use and/or be assigned.

4th Must use only NIOSH/MSHA approved respiratory protection equipment.

NOTE:

Employees who wear nontoxic particle masks (dust masks) as a "comfort" measure, and not as a required respirator, are not required to have a medical evaluation or fit test. However, they must be trained in the proper use and limitations of dust masks, and must use approved equipment.

* * * * * * * * *

15.5 ROLES AND RESPONSIBILITIES

- The Headquarters Office of Safety and Health will provide general and specific information about the Department's Respiratory Protection Program including guidance on the selection of respiratory equipment and updating the training program periodically on a statewide basis.

  The Headquarters Office of Safety and Health will assist supervisors in Headquarters units and Sacramento area Service Centers in providing qualified trainers and/or arranging training-for-trainers for their program.

- The District Safety and Health Officers are each responsible to oversee the program, and ensure that qualified trainers and instructors are available for District personnel.

- The Service Center safety liaison personnel are responsible to oversee the program, and ensure that qualified trainers and instructors are available for Service Center personnel.

- The local supervisor; i.e., the branch chief, shop superintendent, maintenance manager, office chief, is responsible to:

  1. Ensure that all employees who are expected to wear respiratory protection equipment are trained in accordance with the instructions contained in this chapter, which includes training in use and limitations of equipment, facepiece fit testing, inspection and maintenance, sanitation, and storage of respiratory protection devices.

  2. Ensure that the correct respiratory protection equipment is available.

  3. Ensure that employees use the correct respiratory protection equipment as needed for the hazards and work environment.

  4. Arrange for initial and annual fit tests, medical examinations, and maintain applicable records.

- All employees who use respiratory protection equipment are personally responsible:

  1. To correctly use the respiratory protection equipment when needed, or directed to, and to ensure that it remains in good condition.

  2. To clean, inspect, maintain, and properly store their equipment.

15.6 MEDICAL EXAMINATION AND MEDICAL CLEARANCE

All employees who wear a respirator shall have a medical examination by a physician and receive medical clearance before they can wear a respirator. The examination is paid for by the Department.

There are two types of medical examinations: Type 1. For employees who use respirators in normal Caltrans activities, and Type 2. For employees who are HAZMAT team members that wear SCBA self-contained apparatus respirators and protective clothing (level A or Level B). The medical examination also includes a Respirator Medical Questionnaire.

The examination is conducted to confirm that the employee is both physically and psychologically able to wear a respirator and perform their work. Employees are permitted to be re-examined if they fail the initial test as described below.

The content and scope of the medical examination is determined by the physician based upon the employee's responses to the Respirator Medical Questionnaire.

Type 1. Medical Examination typically includes the following:

Physical Examination:
- Height and weight
- Pulse
- Blood pressure

Pulmonary Function Test - Spirometry:
- Forced Vital Capacity (FVC)
- Forced Expiratory Volume 1 (FEV-1)
- Forced Expiratory Flow 25-75%
- Copy of the electronic graphic spirometry test results printed out

Type 2. Medical Examination includes all of the elements in the Type 1. Medical Examination, and the following:

1. CEC with differential, UA, and Chem Panel 20
2. Complete physical including:
    - genitourinary
    - neurologic
    - orthopedic
    - audiometry exam
    - electrocardiogram (EKG) resting EDG, and treadmill stress test (Bruce protocol)
    - eye - near / distant, visual acuity, depth, and color vision

Contact the Office of Safety and Health for additional specifications on Type 2, Medical Examinations regulations.

The Workers' Compensation Case Management Unit can assist in arranging for contracts with medical clinics and/or hospitals to provide medical examination services.

Confidential medical records are available only to the supervisor and others in the decision-making process. Copies of the medical record should be retained by the physician/clinic and Personnel Services.

A sample of the Medical Questionnaire is included at the end of this chapter.

15.6 (A) PASSING THE RESPIRATOR MEDICAL EXAMINATION

To verify that an employee successfully passes the medical examination, the Department provides a form titled - Respirator Certificate. A copy of a certificate should be given to the employee to handcarry to the physician at the time of the medical examination.

The Respirator Certificate provides space for the physician to verify that the employee has passed the medical examination and may use a respirator, or that the employee has not passed the medical examination and shall not use a respirator.

The physician should sign a Respiratory Certificate, for the affected employee, and return it to the supervisor and/or Safety and Health Officer for appropriate action.

The supervisor and/or the Safety and Health Officer shall arrange to have the employee notified of his/her success or failure in passing the medical examination and shall be given a copy of the certificate.

Copies of the certificate should be retained by the supervisor. Copies should be sent to Personnel Services. An additional copy may be maintained by the Safety and Health Officer.

The respirator certificate may be changed to fit local needs.

A sample of the Respirator Certificate is included at the end of this chapter.

15.6 (B) FAILING THE RESPIRATOR MEDICAL EXAMINATION

In the event an employee fails the medical examination (for medical reasons, such as the affects of the flu, or common cold, or permanent medical problem), the following procedures will be followed:

- The employee will be temporarily assigned modified work which does not require the use of a respirator.
- The employee will be administered a second medical examination within two (2) months of the initial examination.
- If the employee passes the medical examination, he/she will be allowed to resume duties that require a respirator. If the employee fails the second examination, he/she will be placed on modified work assignment and will not be allowed to use a respirator.
- The employee will be administered a third medical examination within two (2) months of the second examination.
- If the employee passes the third examination, he/she will be allowed to resume normal duties. If the employee fails the third examination, he/she will remain on modified work assignment and may be placed in another job assignment. The District/Headquarters Personnel Officer and the Workers' Compensation Coordinator will be contacted to discuss alternatives.

****

RESPIRATOR MEDICAL QUESTIONNAIRE

State of California - Department of Transportation
RESPIRATOR MEDICAL QUESTIONNAIRE

EMPLOYEE NAME _____ COST CENTER _____

DOCTOR _____ DATE _____

CONFIDENTIAL
Respiratory Screen Medical Questionnaire

A) Have you recently:

	YES	NO
1. Had a persistent cough	☐	☐
2. Coughed up phlegm	☐	☐
3. Had a shortness of breath	☐	☐
4. Had trouble breathing	☐	☐
5. Had wheezing in your chest	☐	☐
6. Had excessive fatigue or tiredness	☐	☐
7. Coughed up blood	☐	☐
8. Had chest pain	☐	☐
9. Had rapid or irregular heartbeat	☐	☐
10. Been taking medication	☐	☐
11. Been under a doctor's care	☐	☐

Please explain any "YES" answers: _____

B) Have you ever had:

	YES	NO
1. Pneumonia	☐	☐
2. Chronic bronchitis	☐	☐
3. Emphysema	☐	☐
4. Pleurisy	☐	☐
5. Tuberculosis	☐	☐
6. Asthma	☐	☐
7. Food, dust, chemical or animal allergy	☐	☐
8. Cancer	☐	☐
9. High blood pressure	☐	☐
10. Heart disease, heart attack or angina	☐	☐
11. Head or chest surgery or injury	☐	☐
12. An abnormal electrogardiogram	☐	☐
13 Severe claustrophobia	☐	☐
14. Impaired sense of smell	☐	☐

Please explain any "YES" answers: _____

C) Smoking History:

	YES	NO
1. Have you ever smoked cigarettes	☐	☐
a. If yes, do you smoke now	☐	☐
b. About how many cigarettes a day do you usually smoke	____	
2. For how many years have you smoked cigarettes	____	
3. At what age did you start smoking	____	
4. Do you inhale *(draw the smoke into your chest)*	☐	☐
5. If you smoked in the past, how many cigarettes a day did you smoke	____	
6. For how many years did you smoke	____	
a. Did you inhale *(draw the smoke into your chest)*	☐	☐

D) Work History:

Please check any of the following substances which are present where you work or with which you have contact on a regular basis:

- ☐ Solvents
- ☐ Metal fumes or dust
- ☐ Toxic gases
- ☐ Engine exhaust fumes
- ☐ Chemical fumes
- ☐ Coal dust
- ☐ Silica or sand blasting dust
- ☐ Wood dust
- ☐ Cold, spores, pollens, yeast or fungi
- ☐ Insect or plant spray, pesticide
- ☐ Plastic or resin fumes
- ☐ Grain dust
- ☐ Polyurethane
- ☐ Cotton dust
- ☐ Asbestos dust
- ☐ Irritating gases
- ☐ Welding fumes
- ☐ Other dusts

Have you ever become sick as a result of using chemicals, pesticides or herbicides? If yes, please explain: _____

E) Please list the chemicals or dusts which you presently work with which require you to use a respirator *(use reverse side if needed)*:

_____

_____

_____

_____

_____

THIS FORM NOT PRINTED FULL SIZE.

RESPIRATOR CERTIFICATE

State of California - Department of Transportation
RESPIRATOR MEDICAL CERTIFICATE

EMPLOYEE NAME: _____ DATE _____

Attention Physician:

The medical examination for the above named individual is requested to determine if they are physically and psychologically able to wear respiratory protection equipment while performing their work.

Please complete the certificate after conducting a medical examination.

* * * * * *

Attention Caltrans Supervisor:

I have examined the above named individual to evaluate his / her ability to wear respiratory protection equipment with the following results:

____ May use air-purifying / air-supplying respiratory equipment

____ May use self-contained breathing apparatus (SCBA) and Level A protective suit

____ May not use respiratory protective equipment

____ Other restrictions as noted below:

_____

_____

_____

Name of Physician: _____

Signature of Physician: _____ , Date: _____

PLEASE RETURN CERTIFICATE TO:

_____

_____

_____

RESPIRATORY PROTECTION PROGRAM

THIS SPACE AVAILABLE FOR NOTES:

CHAPTER 15

RESPIRATORY PROTECTION PROGRAM

PART 2. SELECTION AND USE OF RESPIRATORS

the 1996 respiratory protection guide

1. INTRODUCTION TO RESPIRATORY PROTECTION
2. THE PURPOSE OF RESPIRATORY PROTECTION
3. APPROVED RESPIRATORY PROTECTION EQUIPMENT
4. EQUIPMENT SELECTION
5. TYPES OF RESPIRATORS
6. HOW RESPIRATORS WORK
7. RESPIRATOR PROTECTION FACTORS
8. RESPIRATOR AND CARTRIDGE SELECTION
9. INSPECTION, MAINTENANCE, REPAIR, AND STORAGE
10. RESPIRATOR FIT-TESTING
11. EXPOSURE RECORDS FOR HAZARDOUS MATERIALS

RESPIRATORY PROTECTION PROGRAM

THIS SPACE AVAILABLE FOR NOTES:

1. INTRODUCTION TO RESPIRATORY PROTECTION

WHY DOES CALTRANS HAVE A RESPIRATORY TRAINING PROGRAM ?

California State law, as defined in the California Code of Regulations, Title 8, Cal-OSHA regulations and codified in General Industry Safety Orders (GISO), Section 5144, Respiratory Protection Equipment, requires every employer with employees, who will wear respirators in their work, to provide a Respiratory Protection Program that contains specific components to ensure employee health and safety.

To comply with the Cal-OSHA regulation, the following specific program components shall be completed by each respirator user in the order given:

1st Pass an appropriate medical evaluation by a licensed physician upon initial assignment and annually thereafter.

2nd Receive training initially and at least annually thereafter in the proper use, selection, maintenance, sanitation, and storage of the respiratory protection equipment they will use and/or be assigned.

3rd Must be properly fit tested initially and at least annually thereafter in the respiratory protection equipment they will use and/or be assigned.

4th Must use only NIOSH/MSHA approved respiratory protection equipment.

NOTE:

Employees who wear nontoxic particle masks (dust masks) as a "comfort" measure, and not as a required respirator, are not required to have a medical evaluation or fit test. However, they must be trained in the proper use and limitations of dust masks, and use NIOSH/MSHA approved respiratory protection equipment. .

Also, State law requires that any Caltrans employee who performs pesticide spraying must receive respirator training as defined in Title 3, and codified in the Food and Agriculture Pesticide Application Regulations, Section 6738, Safety Equipment.

2. THE PURPOSE OF RESPIRATORY PROTECTION

The purpose of respiratory training is to teach employees how to prevent harmful airborne materials from entering their lungs by using respiratory protection.

An additional purpose is to provide information about respiratory hazards found in the workplace, respirator selection, fit-testing procedures, respirator inspection, maintenance and storage, and the medical evaluation process.

There are several types of harmful airborne materials that can be found in the workplace. They include:

- Gas and vapor contaminants (vapors, pesticides, and gases);
- Particulate contaminants (dust and fumes);
- Combination of gas, vapor, and particulate contaminants; and
- Oxygen deficiency (less than 19.5% of oxygen).

Harmful materials found in the workplace can enter the body in four (4) ways:

1. **inhaled into the lungs - the purpose of this Chapter,**
2. absorbed through the skin and eyes,
3. ingested into the stomach, and
4. injected by cut or incision.

Of these four (4) methods of entry, the lungs (human respiratory system) present the quickest and most direct route of entry into the body. Respirators only provide protection from inhalation exposures.

3. APPROVED RESPIRATORY PROTECTION EQUIPMENT

Only respiratory protection equipment approved by the National Institute of Safety and Health (NIOSH), or the Mine Safety and Health Administration (MSHA) is to be used by Caltrans employees.

NIOSH / MSHA approval of respiratory protection equipment is based on testing of the entire unit; therefore, all parts including the filters, cartridges, valves, body, gaskets, and straps must be those supplied by the original manufacturer.

The use of different or non-manufacturer supplied parts between brands is not allowed.

Filter cartridges are not interchangeable between brands.

For approval each respirator must pass specific tests based upon standards established by both NIOSH and MSHA.

When the respirator passes the tests, the respirator is issued an identification number known as a Testing and Certification (TC) Number. The approval number must appear on the box in which the respirator is packed from the manufacturer or on the written guidelines inside the package. The approval number must also appear on all replacement filters and cartridges that are packed and shipped by the manufacturer. This includes disposable respirators and single-use nontoxic particle masks (dust masks).

NOTE:

Single-use, nontoxic particle masks (dust masks) normally used for such things as sweeping the floor or for the control of nuisance dust are considered to be “respirators”and must have a NIOSH / MSHA approval (TC Number).

4. EQUIPMENT SELECTION

Selecting the correct respirator for the job is the first step in protecting employees from the hazards to which they may be exposed. The selection process must be based upon a well-thought out plan that includes the following items:

- Type of air contaminants present (i.e., particles, vapors, gases)
- Hazard of exposure (i.e., IDLH, eye irritant, toxicity)
- Warning properties of contaminants (See ***SPECIAL NOTE–MATERIALS LIST Page 15 of 26**)
- Level of exposure
- Exposure time
- Work activity
- Characteristics and limitations of the respirator equipment
- Level of protection needed

See: NIOSH GUIDE TO RESPIRATOR SELECTION on **Page 23 of 26** for DECISION TREE.

The user should consult with the District / Headquarters Office of Safety and Health for assistance. Additional information can be obtained in other reference materials such as the "NIOSH Guide to Industrial Respiratory Protection" (published by NIOSH - National Institute for Occupational Safety and Health).

5. TYPES OF RESPIRATORS

The following briefly describes the types of respirators used by Caltrans:

1. **Disposable dust masks** are paper-type masks for protection against nontoxic nuisance dusts and mists. They are easy to wear and provide minimal protection.

2. **The half-face cartridge respirator** fits over the nose and under the chin. Half-masks are designed to seal more reliably than quarter-masks and provide increased safety to the wearer. This is the most common respirator used by Caltrans employees. Half-mask facepieces can also be purchased with a hose and belt mounted cartridges for those applications where the cartridges would interfere with other protective equipment; i.e., welding hoods. Half-face respirators are available as reusable or disposable models with a variety of cartridges.

3. **The full-face cartridge respirator** covers from roughly the hairline to below the chin. Because they seal more reliably, they provide greater protection and provide some eye protection as well. Full-face respirators are available with a variety of cartridges.

4. **Powered air purifying respirators (PAPR's)** have a battery powered fan to draw air through a filter(s) and blow it into a hood or facepiece. Some models incorporate the blower and filter into a one piece plastic hat that includes a faceshield. Hoods are generally soft, loose fitting types, but some sandblast type hard hoods can be used. Full-face or half-face facepieces can also be used. PAPR's provide moderate protection and are comfortable to wear.

5. **Sandblasting hoods and helmets** generally enclose the person's head in a hard shell. They serve two (2) functions: they provide fresh air to the wearer and protect the head and body from flying particles generated by blasting. They rely on an external pump or compressor to supply clean air to the wearer through a hose. They are generally considered "loose-fitting" and provide moderate protection.

6. **Air supplied respirators** use external air supplies (air compressor with hoses or carried air tanks) and have tight fitting full facepieces. These include self contained breathing apparatus (SCBA) and air-line respirators. They maintain a positive pressure inside the facepiece and provide the highest level of protection.

6. HOW RESPIRATORS WORK

Respirators fall into two (2) classes:

Air-purifying - Basically a filtering system that cleans the air being inhaled. It is used to remove the contaminants from the air.

Air-supplying - A system that supplies its own air through a hose or tank and is independent of the surrounding air. It is used where there is insufficient oxygen in the air or where air-purifying types do not provide enough protection.

Air-purifying - This system depends on the surrounding air for oxygen and filters the contaminants from the employee's breathing air. It is the easiest type to train on and use, but does have limitations.

Before using an air-purifying respirator, the following conditions shall be assured:

- the atmosphere of the work area must contain at least 19.5% oxygen,
- approximate concentration of contaminants must be known to ensure that the respirator's capabilities are not exceeded,
- concentration of contaminants cannot exceed the "Immediately Dangerous to Life and Health" (IDLH) levels (Generally, air purifying respirators cannot be used with IDLH materials unless the concentration is known.),
- contaminants must have good warning properties so filter "breakthrough" can be detected, (See ***SPECIAL NOTE Page 15 of 26)**
- employee must be fit-tested to ensure the correct size of respirator and must wear the respirator properly

  (Exception: powered air-purifying respirators and sandblasting hood/helmets with loose fitting hoods do not require fit-testing.),

- employee must be medically capable of wearing an air purifying respirator.

The air-purifying class of respirator includes all types that use filters, cartridges, canisters, or combinations of filters including powered models and dust masks.

There are many types, styles, and shapes including half-face and full-face styles, quarter masks, dust masks, gas masks, and powered air-purifying types with masks and hoods. They may be single or multiple cartridge/filter styles.

SPECIAL NOTE:

Title 3 of the Department of Food and Agriculture regulations requires that when air-purifying type respirators are used for protection against pesticides, the following guidelines shall be used:

1) the air-purifying elements shall be replaced according to pesticide product labeling directions; or

2) respiratory equipment manufacturer recommendations, whichever is most frequent; or

3) at the first indication of odor, taste, or irritation; or,

4) absent any other instructions on service life, at the end of each day's work period.

For other non-pesticide uses, cartridges/filters shall be changed whenever "breakthrough" occurs, whenever the filters become clogged and breathing becomes difficult, or every eight (8) hours. Store used cartridges separately from respirator body. Put them in a plastic bag to prevent cross contamination.

If the wearer detects an odor, taste or irritation, he/she shall leave the work area immediately and go to a safe area with clean air away from the hazard. The cartridge on the respirator shall be replaced and the respirator fit shall be checked with the positive-negative test. If the fit is satisfactory, the work may continue; otherwise, the employee shall not resume work until the situation has been corrected.

Exceptions to the change intervals described above will be allowed when exposure is minimal and the respirator usage is a "comfort" measure. Supervisors shall be responsible to determine if the change interval can be extended.

"Disposable" and "one-time use" respirators shall be thrown away after use.

Air-supplying - This type of system supplies its own breathing air through a carried tank or airline.

Because they supply their own air, these systems are useful in environments where contaminants are unknown or have poor warning properties, and/or where large concentrations of contaminants are expected. This type of system is often difficult to work with, requiring special support equipment and training.

Because of their weight and restrictiveness, their use requires more physical effort; therefore, employees who are required to work with this type of respiratory equipment must be both physically and psychologically able to perform the work.

There are basically two (2) types of air supplying respirators:

1) TANK SUPPLIED - "self-contained breathing apparatus" **(SCBA)** respirator.

Characteristics -

- air tank is carried on back of user, supplies air to full-facepiece, tight fitting mask;
- self-contained unit, not connected to outside equipment;
- does not depend on outside air, can be used where air purifying type respirators are not acceptable;
- this type of respirator provides maximum protection from contaminants; and
- maintains positive pressure inside facepiece.

Restrictions -

- has limited supply of air (most Caltrans equipment has 1-hour air tanks with 1/2 hour service life);
- physically and psychologically demanding of user;
- requires on-site medical monitoring during extended use to prevent physical exhaustion;
- requires specialized training and extensive "hands-on" use to maintain competence;
- bulky, restricts movement and vision;
- equipment requires monthly inspection and annual service;
- requires fit-test of face mask;
- requires annual medical evaluation before use;
- requires specialized support equipment to fill air tanks;
- must ensure that air tanks contain the correct air for the designed use; (Grade "D" Breathing Air); and
- use restricted to trained HAZMAT team members only.

2) AIRLINE SUPPLIED - "airline" respirator.

Characteristics

- breathing air is supplied through a hose to a full facepiece, half facepiece, or loose fitting helmet / hood;
- maintains positive pressure inside mask or hood;
- connected to outside air supplying equipment with air hose;
- does not depend on outside air, so can be used where air-purifying respirators are not acceptable;
- unlimited (usually) supply of air, extended duration work is possible, and
- full facepiece type provides maximum protection from contaminants, loose fitting hoods provide limited protection.
- hood can also provide physical protection from particles; i. e., sandblasting.

Restrictions

- limited mobility because of air hose;
- restricted vision (helmet / hoods);
- requires specialized training;
- requires fit test of face mask (exception: loose helmet / hood);
- requires annual medical evaluation before use;
- loose hoods provide lower protection factors, and may not be suitable for high concentrations of contaminants, tight fit facepieces require auxiliary air bottles if used in dangerous atmospheres; and
- requires special air supplying equipment:

    1) "breathing air only" air compressor; or
    2) air compressor with a continuous carbon monoxide monitor with / without air temperature alarm, or
    3) weekly carbon monoxide check of air (log and retain for 6 months), and compressor discharge air temperature alarm, and
    4) appropriate in-line sorbent beds and filters.

SPECIAL NOTE:

Although both **SCBA** and tight fitting **airline supplied respirators** can provide protection from high concentrations of contaminants and dangerous atmospheres, they shall not be used by Caltrans employees for entry into "Immediately Dangerous to Life and Health" (IDLH) atmospheres, explosive, flammable and / or oxygen deficient locations unless the following conditions are met:

1) must have a complete site safety plan;
2) must perform proper "hazard assessment" before entry;
3) must have backup team equipped with SCBA standing by before entry;
4) must use other employees for visual and / or verbal contact (buddy system);
5) must have a communications system;
6) must have proper environmental monitoring equipment;
7) must have proper additional protective equipment as required;
8) all employees must be properly trained;
9) must have appropriate decontamination set up before entry;
10) must have appropriate emergency response procedures and rescue equipment on site;
11) must have provisions for emergency medical help on site; and
12) if utilized in a confined space, all provisions contained in Chapter 14 - CONFINED SPACES of this manual shall apply;
13) have notified the District / Headquarters Office of Safety and Health.

* * * * * * * * *

7. RESPIRATOR PROTECTION FACTORS

Different types of respirators have different ratings of effectiveness. These rating are based on fit, type of seal, and physical characteristics of the equipment. These ratings are called PROTECTION FACTORS, and are established by National Institute of Occupational Safety and Health (NIOSH) for each type of respirator.

TYPE OF RESPIRATOR	PROTECTION FACTOR
DUST MASK	5
HALF FACE CARTRIDGE RESPIRATOR	10
FULL FACE CARTRIDGE RESPIRATOR	50
LOOSE FITTING BLAST HELMET / HOOD WITH SUPPLIED AIR IN CONTINUOUS FLOW	25*
LOOSE FITTING HOOD WITH POWERED AIR PURIFYING RESPIRATOR (PAPR) WITH HIGH EFFICIENCY (HEPA) FILTERS	25
TIGHT FITTING POWERED AIR PURIFYING RESPIRATOR (PAPR) WITH HIGH EFFICIENCY (HEPA) FILTERS	50
HALF FACE AIRLINE SUPPLIED RESPIRATOR IN POSITIVE PRESSURE MODE	1,000
TIGHT FITTING, FULL FACEPIECE, AIRLINE SUPPLIED RESPIRATOR IN POSITIVE PRESSURE MODE	2000
TIGHT FITTING, FULL FACEPIECE, SELF-CONTAINED BREATHING APPARATUS (SCBA) IN POSITIVE PRESSURE MODE	2,000 +

These protection factors are used to determine if the selected respirator will provide adequate protection at a given level of contamination.

*NOTE:

Bullard Model 77 and 88 Sandblasting hoods have a tested protection factor of 1,000 when operated in accordance with manufacturer's air flow requirements.

See example on next page.

EXAMPLE:

- A work operation involves exposure to lead dust at a concentration of 1,000 ug/m3 in the air.
- The employee has a half face cartridge respirator with high efficiency (HEPA) cartridges with Protection factor = 10. (see Protection Factors above),
- The Cal-OSHA Permissible Exposure Limit (PEL) for lead is 50 ug/m3.

Will the selected respirator provide adequate protection for the employee ?

$$\frac{\textit{Concentration in Air}}{\textit{Protection Factor}} = \textit{Respirator Wearer's or User's Exposure.}$$

$$\frac{\textit{1,000 ug/m3}}{10} = \textit{100 ug/m3} = \textit{Respirator Wearer's or User's Exposure}$$

DECISION:

- Because the respirator user's exposure would be more than the permissible exposure limit, a half-face respirator is NOT adequate to protect the employee.
- A full-face cartridge respirator with (protection factor of 50) or a blast helmet (protection factor of 25) would be adequate to protect the employee.

8. RESPIRATOR AND CARTRIDGE SELECTION

To standardize usage and ensure interchangeable parts of respiratory protection equipment within the Department, the following brands and models are recommended:

- Half-face respirator, use MSA Comfo II;
- Full-face respirator, use MSA Comfo II;
- SCBA respirators, use MSA Air Pack;
- Dust masks, may use various brands;
- Airline supplied helmet (sand blasting), use various brands;
- Airline supplied Full-face, use various brands;
- Powered Air-Purifying Respirator (PAPR), use various brands.

Approved respirators currently in use may continue to be used but, when replacements are being considered, use the above recommendations.

If the above recommendations do not meet your needs, contact the Headquarters Office of Safety and Health for assistance.

***SPECIAL NOTE: MATERIALS LIST**

Never use **air-purifying** respirators for the following materials:

Acrolein	Methylene bisphenyl isocyanate
Aniline	Nickel carbonyl
Arsine	Nitro compounds: Nitrobenzene,
Bromine	Nitrogen oxides,
Carbon Monoxide	Nitroglycerin,
Dimethylaniline	Nitromethane
Dimethyl sulfate	Ozone
Hydrogen cyanide	Phosgene
Hydrogen fluoride	Phoshine
Hydrogen selenide	Phosphorus trichloride
Hydrogen sulfide	Stibine
Methanol	Sulfur chloride
Methyl bromide	Tolune diisocyanate (TDI)
Methyl chlorine	Vinyl chloride

This list is not all inclusive. Contact the Safety and Health Office for information and assistance.

See next page for respirator cartridge selection guide .

RESPIRATOR CARTRIDGE SELECTION GUIDE

To assist employees in the selection of the proper respirator cartridge, the following cartridges are available directly from MSA at 1-800-MSA-2222. Except for GMP the Caltrans warehouse does not stock these items.

COLOR	MSA #	TYPE	CONTAMINANT - JOB TYPE
BLACK	GMP 464025	Organic vapor w / prefilter (Pesticides)	Pesticides, polyester concrete, solvents, organic vapors
MAGENTA	H 464035	HEPA- High Efficiency Particulate	Asbestos, lead, dust, metal fumes, regular asphalt paving, fit testing
MAGENTA and BLACK	GMA-H 464029	Combination - HEPA & Organic Vapor	PBA asphalt paving, Rubber Modified asphalt paving, methacrylate, polyester concrete
MAGENTA and YELLOW	GMC-H 464027	Combination - HEPA & Acid Gas	Rubber Modified paving, fit testing

For assistance in respirator selection, contact the Safety Office.

NOTE:

See NIOSH Guide to Respirator Selection - DECISION TREE, **Page 23 of 26.**

9. INSPECTION, MAINTENANCE, REPAIR, AND STORAGE

All respiratory protection equipment shall be inspected before and after each use. The inspection shall include examination of:

1. the facepiece;
2. the head straps or head harness;
3. the exhalation and inhalation valves;
4. the air-purifying elements (if applicable);
5. if equipped with a corrugated breathing tube, the tube, the tube ends, connectors, clamps, and tube for cracks and stretching;
6. the air supplying hoses, regulator (if applicable) and filters, etc.; and
7. the tanks and harness for cuts, cracks, and defects.

Rubber or elastomer parts shall be inspected for pliability and signs of deterioration. Stretching and manipulating rubber elastomer parts with a massaging action will keep the parts pliable and flexible and prevent the parts from distorting during periods of storage.

If a rubber valve, after being rolled between the thumb and forefinger, does not return to its original shape, it should be replaced.

If any part of the respirator is damaged or missing, the respirator shall not be used until it has been properly repaired.

Replacement and repair of respirators shall be done only by experienced persons with replacement parts designed for the specific respirator.

No attempt shall be made to replace component parts or make adjustments or repairs to respirators unless the repair work is in full compliance with the manufacturers' instructions.

New equipment shall be issued to replace worn or damaged equipment. Any equipment that appears to be or is suspected of being damaged shall be inspected and removed from service by the supervisor.

Always store the respirator, filters, cartridges, and other parts in a clean dry place, preferably in a tightly closed paper or plastic container. They should be protected from dust, sunlight, heat, extreme cold, excessive moisture, and chemicals.

They should be stored in a single layer with the facepiece and exhalation valve in a normal rest position to prevent the rubber from taking a permanent distorted shape. A tightly closed plastic container is preferred.

Respirators shall not be stored in personal lockers or tool boxes unless they are in a separate respirator container. A rectangular plastic container with a lid size of at least 11 inches, by 7 - 3/8 inches, by 4 - 5/8 inches deep is recommended for storing the half mask respirator.

Respirators and SCBA equipment that are not routinely used, but kept for emergency use, shall be inspected after each use and at least monthly to ensure that the equipment is in satisfactory working condition. SCBA inspections shall be documented and maintained by the supervisor. A record of each inspection will also be kept with the individual SCBA unit.

Respirators shall be cleaned as necessary, or on a weekly basis at a minimum. The cleaning shall include cleaning, sanitizing, rinsing, and drying.

The following are useful hints when cleaning respirators:

- Use a soft brush to facilitate cleaning.
- Remove filters, cartridges or canisters, and dispose of as necessary.
- Wash facepiece and breathing tube in mild soap, rinse thoroughly to remove all residue.
- Air dry in a clean area. (Never apply heat to respirators.)
- Clean all parts as recommended by the manufacturer.
- Inspect valves, head straps, and other parts and replace as necessary.
- Insert new filters, cartridges, or canisters.
- Make sure all seals are tight with cartridge gaskets in place.
- Place in sealable plastic bag or container for storage.

Respirators worn by multiple users must be disinfected and cleaned between uses.

Single purpose dust masks and disposable respirators shall be thrown away at the end of the work shift, or as needed.

10. RESPIRATORY FIT-TESTING

The purpose of the fit-test is to match the respiratory device to the physical characteristics of the individual's face. To ensure that the respiratory protection equipment will work properly under actual working conditions, the facepiece or mask must fit properly. Face size, gender, and bone structure affect the face seal and the fit.

All masks and facepieces come in three sizes: small, medium, and large. Most people can obtain a good fit with the medium size, but other sizes may be required.

Generally, a full facepiece will fit better than a half-facepiece mask; but for most work applications, a half-facepiece mask is acceptable.

Special Conditions

Before starting the fit-test process, the following conditions must be evaluated:

- **Facial hair -** Employees who must wear respirators must shave off their facial hair, as facial hair interferes with a good seal.
- **Eye glasses -** Should not be used with full-facepiece respirators. (Use spectacle kits to hold eyeglass frames in facepiece.)
- **Facial deformities -** such as scars, deep skin creases, prominent cheekbones, or similar conditions can prevent proper sealing.
- **Communications -** talking while wearing a facepiece can cause a break in the seal.
- **Physiological response -** respirators may impose some physiological stress. Weight of the equipment increases energy requirements and cartridges cause breathing resistance.

Specific Details of the Fit-Testing Process

The actual fitting of the respirator to the individual consists of the following steps:

1. Face Fitting

The employee's acceptance of a particular respirator depends on the facepiece fit, interference with vision, weight of the device, breathing resistance, and general over-all comfort. The ability to form a good facepiece seal depends on the respirator design and facial features of the individual.

Select a respirator that closely matches the size of the individual's face size. MSA respirators come in three sizes: small, medium, and large. Secure the respirator facepiece to the individual's face by adjusting the head straps. The respirator should fit comfortably against the facial contours of the person, not too tight, and should not distort facial features of the person or deform the facepiece of the respirator. It should have a comfortable facepiece-to-facial skin contact.

2. Negative Pressure Test

The negative pressure test consists of: closing off the inlet of the canister, cartridge(s), or filters(s) by covering with the palm(s) of the hand or using rubber seals, or by squeezing the breathing tube so that it does not pass air; inhaling gently so that the facepiece collapses slightly; and holding the breath for 10 seconds. If the facepiece remains slightly collapsed and no inward leakage is detected, the respirator is probably tight enough. The employee should use this test each time a respirator is worn.

3. Positive Pressure Test

This positive pressure test is very like the negative pressure test, and it has the same advantages and limitations. It is conducted by closing off the exhalation valve and exhaling gently into the facepiece. The fit is considered satisfactory if slight positive pressure can be built up inside the facepiece without any evidence of outward leakage. The employee should use this test each time a respirator is worn.

4. Irritant Smoke Test

The employee shall wear a respirator that has been selected as described above, except that each respirator shall be equipped with high efficiency particulate (HEPA) cartridges.

The irritant smoke is made up of stannic chloride-impregnated pumice.

The employee shall be allowed to smell a weak concentration of the irritant smoke to familiarize him/herself with its characteristic odor.

The tests an employee shall perform are the conventional positive pressure and negative pressure test checks as described above, and to wear the respirator for at least fifteen (15) minutes before starting the test.

Advise the employee that the smoke can be irritating to the eyes and instruct the employee to keep his/her eyes closed while the test is being performed.

The supervisor/trainer shall direct the stream of irritant smoke from the tube towards the facepiece area of the employee. Begin at least 12 inches from the facepiece and gradually move to within 3 or 4 inches moving around the whole perimeter of the facepiece mask. Be cautious, ends of irritant smoke tubes are sharp.

The stannic chloride tube is scored at each end for easy breaking. A squeeze bulb with a short rubber tube aspirates air through the tube. Visible smoke is immediately formed by contact of the stannic chloride with moisture in the air.

The following exercises shall be performed while the respirator seal is being challenged by the smoke.

- normal breathing;
- deep breathing (breaths are deep and regular);
- turn head side-to-side;
- nod head up-and-down; and
- talk, slowly and distinctly.

If the irritant smoke produces an involuntary reaction (cough) by the employee, the test shall stop and another respirator shall be used. It may be necessary to try different sizes of respirator before finding the most suitable item. Continue the test after finding the correct respirator. The employee should wash his/her hands and face after the test.

Only approved HEPA cartridges shall be used during the irritant smoke test. For example, for MSA respirators, use Type H 46035, GMA-H combination filter - cartridge - 464029, or GMC-H combination filter - cartridge - 464027.

5. Fit-Test Record

After the respirator fit-test has been completed, the supervisor shall document that the employee has successfully completed the fit-testing and is qualified to wear a respirator. The information shall be documented on the "Respiratory Equipment Fitting and Testing Record" form.

The fit-test record form provides for the name of the employee, date of the test, and type of respirator used. The employee shall sign the form to verify that he/she has been fit-tested.

Copies of the fit-test record shall be maintained by the supervisor.

A sample of the "Respiratory Equipment Fitting and Testing Record" form is shown at the end of this section.

11. EXPOSURE RECORDS FOR HAZARDOUS MATERIALS

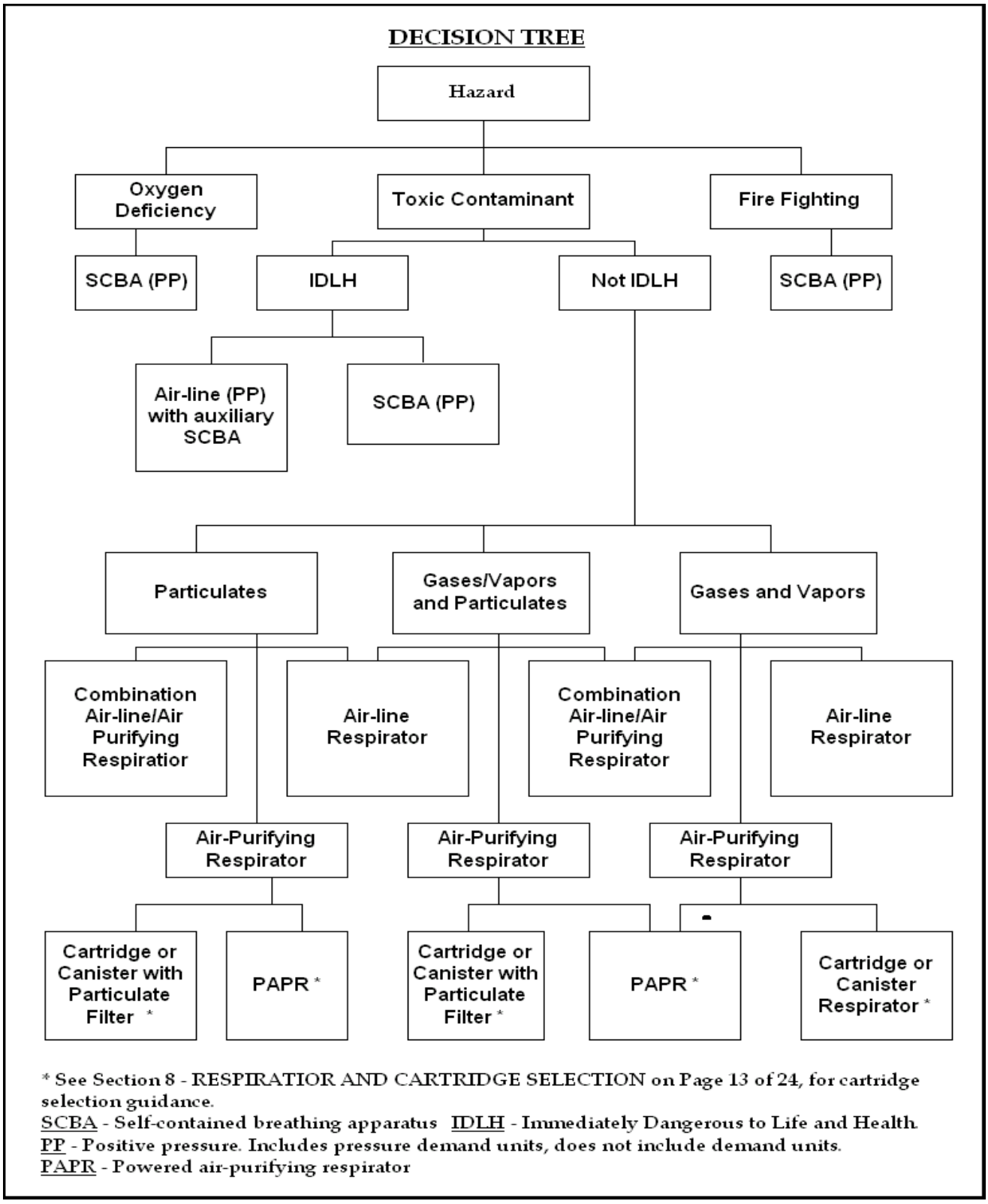
There are two (2) methods to record employee exposure to hazardous materials:

1. <u>All Programs</u>. [Includes Maintenance, Construction, Structures and others.] Supervisors should establish a "Respirator Information Data Card" for each employee required to wear a respirator. The card should be kept with the employee's medical information and transferred with the employee as they change positions.

2. <u>Maintenance Program</u>. Maintenance supervisors with pesticide applicators will use the "D Card" in the MMS computer system to record respirator usage.

A sample of the "Respirator Information Data Card" showing employee's name, type respirator, medical exam and fit-test, is included at the end of this section.

NIOSH GUIDE TO RESPIRATOR SELECTION Page 22 of 24



* See Section 8 - RESPIRATION AND CARTRIDGE SELECTION on Page 13 of 24, for cartridge selection guidance.
SCBA - Self-contained breathing apparatus IDLH - Immediately Dangerous to Life and Health
PP - Positive pressure. Includes pressure demand units, does not include demand units.
PAPR - Powered air-purifying respirator

RESPIRATOR EQUIPMENT FITTING AND TESTING RECORD **Page 24 of 26**

Respirator Equipment Fitting and Testing Record

District/Unit _____

Supervisor _____ Date: _____

NAME	DATE FITTED	TYPES RESPIRATOR FITTED	TRAINING RECEIVED*

*Employee trained initial this column.

RESPIRATOR INFORMATION DATA CARD

Respirator Information Data Card

Name _____ Last Yearly Medical Examination _____

S.S.# _____

Type Respirator _____ Last Fitting & Training _____

Size Respirator _____
(small, medium, large, x-large)

DATE Month Day Year	Type of Substance Exposed to (% Concentration, Rate) *or* Type of Work Activity (Sandblasting, Welding, ect.)	Location Where Exposure Took Place	Types of Personal Protective Devices Used (Other than Respirator)	Duration of Exposure (Time Spent Mixing, Loading, Applying, Welding, Painting, etc.)	Verification (Personally Initial) EMP	SUP

THIS FORM NOT PRINTED FULL SIZE

RESPIRATORY PROTECTION INSTRUCTOR GUIDE

THIS SPACE AVAILABLE FOR NOTES:

CHAPTER 15

RESPIRATORY PROTECTION PROGRAM

PART 3. CLASSROOM PREPARATION FOR INSTRUCTORS

1. Introduction to classroom discussion
2. Classroom preparation and required materials
3. Organizing handout materials
4. Instructor's introduction
5. Begin discussion

1. INTRODUCTION TO CLASSROOM DISCUSSION

This training material has been designed to aid the instructor in the office, maintenance region, or shop to achieve and maintain a training program that will comply with the requirements of the General Industry Safety Orders and applicable NIOSH/MSHA guidelines.

The training also includes provisions for each participant to:

1. have an opportunity to handle the respiratory equipment,
2. be properly fitted,
3. be tested for facepiece-to-face seal,
4. have a long familiarization period (15 to 30 minutes) of wear in a normal air environment,
5. understand equipment inspection, cleaning, repair and storage.

Other topics include:

1. engineering controls and administrative controls, and why respirators are needed,
2. the nature of the respiratory hazard and what happens if the respirator is not used properly,
3. why the particular type of respirator is being used,
4. how to recognize and handle emergencies.

The classroom training allows for demonstrations and practice sessions in wearing, adjusting, and determining a proper and comfortable fit for each participant.

2. CLASSROOM PREPARATION AND REQUIRED MATERIALS

The instructor should have the following items available in the classroom:

- COPIES OF PART 2. ***the 1996 respiratory protection guide***
- VIDEO MACHINE AND VIDEO TAPE
- OVERHEAD PROJECTOR
- WALL DISPLAYS
- SAMPLE RESPIRATORS
- SAMPLE CARTRIDGES AND FILTERS
- CLEANING SOLUTIONS, SMOKE TUBES, ETC.
- EASEL AND PAPER
- MARKER PENS
- SIGN-UP SHEET

3. ORGANIZING HANDOUT MATERIALS

Handout materials should be organized in the order in which they will be passed out. Wall displays should be posted. Material samples should be placed on table tops for viewing. The training plan provides a step-by-step narrative for discussing respirators.

ONLY EMPLOYEES WHO HAVE TAKEN AND PASSED THE MEDICAL EVALUATION ARE PERMITTED TO ATTEND THE TRAINING.

MAKE SURE THAT EACH PARTICIPANT HAS BEEN MEDICALLY CERTIFIED.

4. INSTRUCTORS INTRODUCTION

The instructor should begin the training class by introducing him / herself.

Welcome to the Caltrans Respiratory Protection Training Course

WHO AM I ? Introduce self and co-instructor if any.

WHY I AM HERE. Today I (we) will provide you with information necessary to understand how respirators work, how they can protect you against hazards in the workplace.

Before I (we) begin I (we) want to explain some general housekeeping details and how this training program is organized. (Explain time period of training, rest rooms, rest breaks, and lunch, if applicable.)

Pass out sign-up sheet. Tell participants which accounting numbers to use for their time records.

5. CLASSROOM DISCUSSION

Remove Part 2. SELECTION AND USE OF RESPIRATORS, ***the 1996 respiratory protection guide***, beginning with page 15-13 **(Page 1 of 24)** through page 15-36 **(Page 24 of 24)** from the Safety Manual to make copies for the each participant.

After making copies for the participants replace the pages back in the Safety Manual for future use.

Before beginning the discussion give each participant a copy:

the
1996
respiratory
protection
guide